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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/915,160	07/25/2001	Toshiharu Yanagida	09792909-5171	7228

7590 10/06/2004
Christopher P. Rauch
SONNENSCHN NATH & ROSENTHAL
Sears Tower, Wacker Drive Station
P.O. Box #061080
Chicago, IL 60606-1080

EXAMINER

IM, JUNGHWA M

ART UNIT	PAPER NUMBER
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2811

DATE MAILED: 10/06/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

AK

Office Action Summary	Application No.	Applicant(s)	
	09/915,160	YANAGIDA, TOSHIHARU	
	Examiner	Art Unit	
	Junghwa M. Im	2811	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 01 September 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 2,5,6 and 25 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 2,5,6 and 25 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 2, 5, 6 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Milewski et al. (US 6,330,967), hereafter Milewski in view of Nishikawa et al. (US 5,878,943), hereafter Nishikawa.

Regarding claims 5, 6 and 25, Figure 4 of Milewski shows a semiconductor apparatus comprising:

- a semiconductor chip 10 inherently having a circuit pattern;
- a plurality of solder bumps 33 of two different materials 35 on the semiconductor chip connect to the circuit pattern, the solder bumps forming spaces;
- a passivation film 14 [in Fig. 3] disposed directly on the semiconductor chip and said solder bumps, said passivation film being disposed in the spaces between solder bumps such that upper surfaces of said solder bumps protrude from said resin layer;
- a eutectic solder layer 37 disposed on the upper surface of the solder ball;
- a mounting board 21;
- a plurality of lands 53 formed on said mounting board and aligned opposite said solder bumps;
- a precoated solder layer 51 disposed on said lands [col. 5, lines 1-5];

wherein said eutectic solder layer of said solder bumps and said precoated solder layer join said upper surfaces of said solder bumps to said lands of said mounting board such that a stacked structure is obtained;

wherein a gap is formed between said passivation layer and said mounting board of said stacked structure.

Milewski fail to disclose the aspect of cleaning the upper surface of the metal bumps. Figure 18 of Nishikawa shows the surfaces of the metal bumps being cleaned (col.12, lines 18-25). It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the teaching of Nishikawa to the device of Milewski in order to enhance the strength of the soldered junction through having a clean surface of metal bumps.

Even though Milewski does not explicitly disclose that the passivation layer is a resin film, it would be obvious to one of ordinary skill in the art at the time of the invention to use resin for the passivation layer of Milewski with the teachings of Nishikawa since resin is well known and widely used passivation/dielectric material for packaging the semiconductor device.

Regarding claim 2, Nishikawa teaches the surfaces of the metal bumps being cleaned of components causing a rise of a connection resistance and a drop in a joint strength at least connection interfaces. Nishikawa teaches, throughout the specification especially in col. 1, lines 22-40, cleaning method of oxide/contamination coating on the surface of metal bumps to enhance better alignment between the soldering joint.

Response to Arguments

Applicant's arguments filed September 1, 2004 have been fully considered but they are not persuasive. The rejection stands, modified only to accommodate the amendments made to the claims by Applicant. New rejections are made in response to Applicant amended claims.

In addition, Examiner presents the remarks below in response to Applicant's arguments.

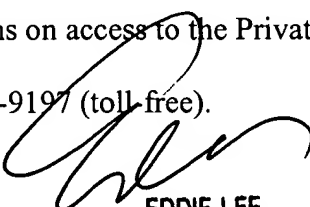
Applicant argues that Milewski *teaches away* from the use of such precoated land *and* a coated solder ball." First, Examiner would like to point out that the instant invention recites a limitation of "a precoated *solder layer* disposed *on the lands*. the Office Action above discusses this aspect in detail with the teachings of Milewski.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Junghwa M. Im whose telephone number is (571) 272-1655. The examiner can normally be reached on MON.-FRI. 8:30AM-5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie C Lee can be reached on (571) 272-1732. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll free).



EDDIE LEE
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800

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